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38. Разгадка "Джемини" уже совсем близка! Часть 8.

11-14 minutes

Previous parts:

Part 1. How the spacewalk was filmed in the pavilion, or the solution to Gemini 4.

Part 2. Where the glove flies, or the solution to "Gemini 4".

Part 3. Somersault in zero gravity, or the solution to "Gemini-4".

Part 4. Rotary decoration for weightlessness, or "Gemini-4" solution.

Part 5. He turned the astronaut upside down and was dumbfounded. The answer to Gemini.

Part 6. Why did the astronaut tug on the halyard so hysterically? The answer to Gemini.

Part 7. How did you get incredible angles in outer space if the astronaut was hanging motionless in the pavilion? The answer to Gemini.

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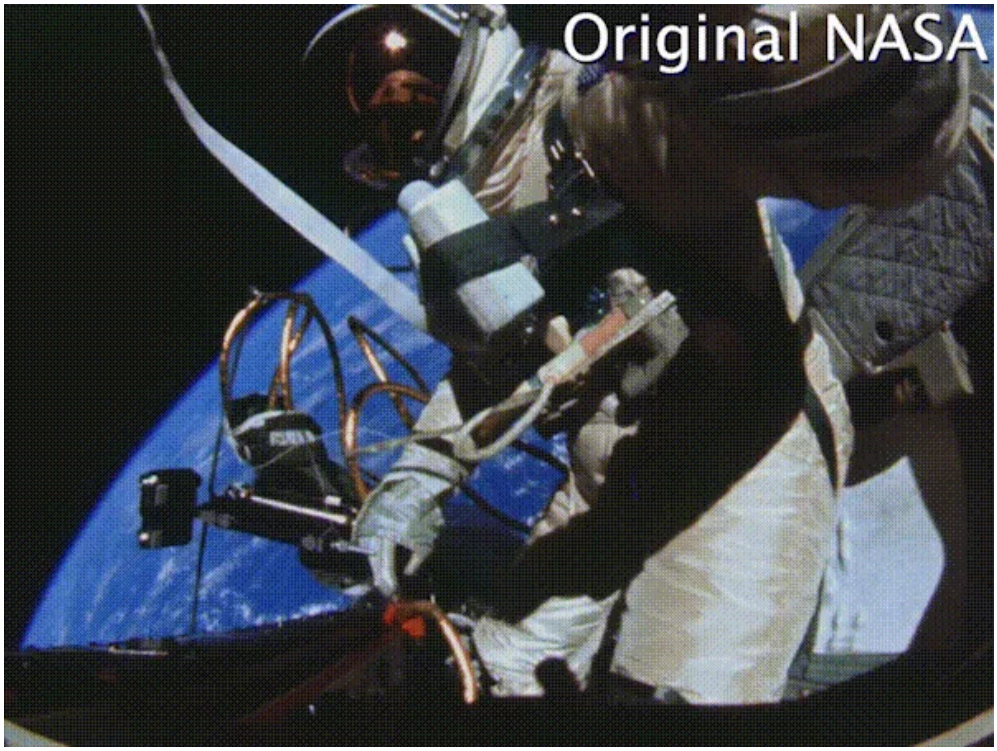
Whoever watches with us the analysis of the video of the American astronaut E. White's spacewalk, it has long been clear that there was no spacewalk, the astronaut was simply hanging on a rope, and the entire spacewalk was filmed in the pavilion with the use of film tricks. Moreover, these "tricks" begin to give themselves away literally from the very beginning. Only the first 3 seconds have passed video (the link to the video itself is highlighted in blue), when suddenly a pneumatic gun lying freely in the right hand rises up and flies into the left hand.



The beginning of the video, from the 3rd to the 7th second.

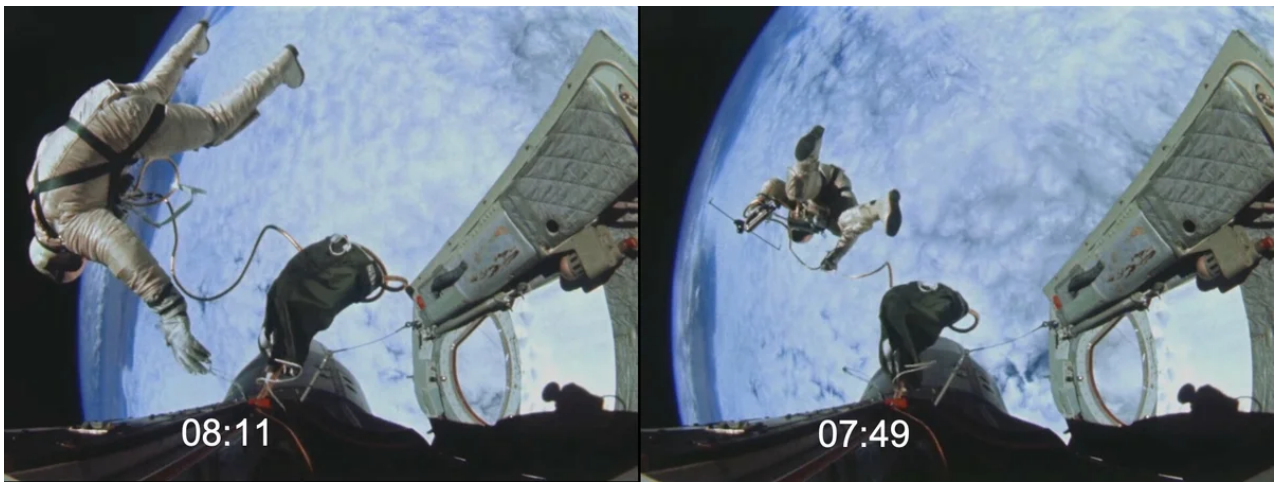
We already know that this strange behavior of the air gun is due to the fact that this video was filmed using the reverse shooting method. And the actor portraying the astronaut, in fact, just released him from his hand, and the pneumatic gun, under its own weight, sank down.

If the original NASA video is started in reverse, the movement of the airgun will become natural and logical.

The fragment was launched in reverse. The movement of the pneumatic gun became natural.

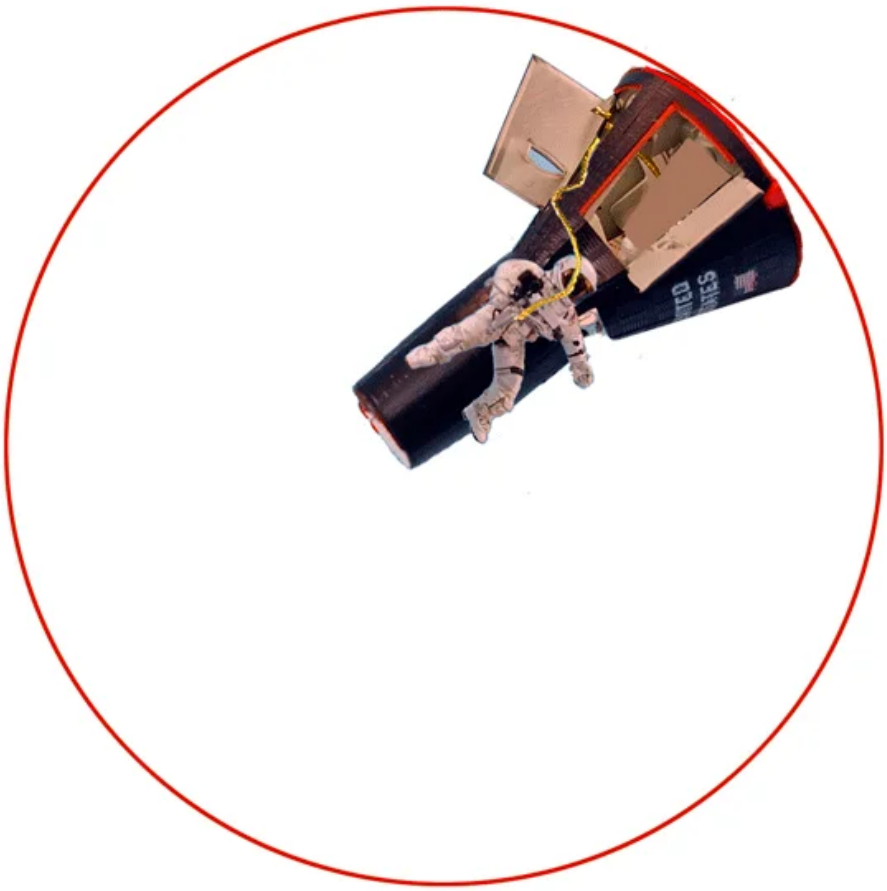
In the previous parts, we found out that the actor was almost motionless on the cable and did not move anywhere. The decrease in the apparent size of the astronaut was due to the fact that the capsule, together with

the attached movie camera and background, was removed from the actor.



The actor in the frame is reduced in size.

The camera moved along with the capsule in a circle around the actor, it was a large rotating drum. At the same time, the actor hung away from the center of the drum rotation axis. Initially, at the top point, the capsule with the movie camera was located close to it (time 08:11), and at the bottom point of the survey (07:49), this distance from the camera to the astronaut increased - and the astronaut, accordingly, decreased in size. The red circle is the trajectory of the motion picture camera attached near the border of the hatch.



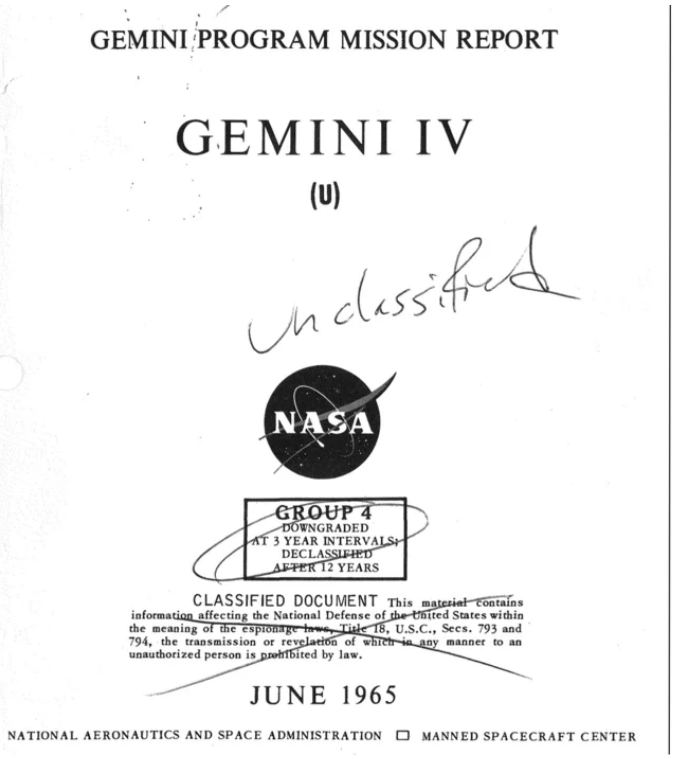
The movement of the capsule in the drum relative to the suspended astronaut.

The maximum distance of an actor from the camera is 3.5 meters, which is approximately
1 meter from the nose of the capsule. And since the movie screen, where the Earth's cloud cover is projected,

moves synchronously with the film camera, but is located on the opposite side of the drum, it is easy to understand that the distance to the background is only 7 meters.

Of course, due to the use of an ultra-wide-angle lens, it seems that the clouds are very far away, and that the astronaut has flown far away, but this is a deceptive impression. The film camera traces an arc of a circle with a diameter of 7 meters, and from the hanging actor to the clouds in the background - only 3.5 meters. Based on these distances, we can calculate the size of the screen in the background.

According to NASA, White's exit was filmed with a 16mm movie camera, most likely with a 5mm focal length lens.



GEMINI PROGRAM MISSION REPORT

GEMINI IV

(U)

Unclassified

NASA

GROUP 4
DOWNGRADED
AT 3 YEAR INTERVALS;
DECLASSIFIED
AFTER 12 YEARS

CLASSIFIED DOCUMENT This material contains information affecting the National Defense of the United States within the meaning of the espionage laws, Title 18, U.S.C., Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

JUNE 1965

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ☐ MANNED SPACECRAFT CENTER

TABLE 3-III.- CREW STATION STOWAGE LIST

Operational Equipment

No.	Item	Quantity	Remarks	Container (a)
1	Flight plan filmstrip	1	Installed on flight plan display located on center instrument panel	
2	Flight booklets	2	Stowed with item no. 54	
3	Orbital path display assembly	1	Stowed with item no. 54	
4	Plastic bags (CF55056-1)	6	Stowed in pouch in right-hand aft food box	6
5	Plastic bags (CF55056-2)	14	Stowed in pouch in right-hand aft food box	6
6	Plastic bags (CF55056-3)	10	Stowed in pouch in right-hand aft food box	6
7	16-mm sequence camera	1	Stowed in fiber-glass container in center stowage box	7
8	16-mm sequence camera (for EVA photography)	1	Stowed in right-hand aft food box	6
9	16-mm film magazines (for item no. 7)	4	Two stowed in right-hand side food box. One stowed on camera (item no. 7)	3 7 & 10
10	16-mm film magazine (for item no. 8)	1	Stowed on camera (item no. 8)	6
11	Mounting bracket (for item no. 8)	1	Stowed on camera (item no. 8)	6
12	5-mm lens assembly (for item no. 8)	1	Stowed in pouch in right-hand aft food box	6
13	Insulation pouch (for item no. 8)	1	Stowed on camera (item no. 8)	6
14	25-mm lens assembly (for item no. 7)	1	Stowed with item no. 7	7
15	18-mm lens assembly (for item no. 7)	1	Stowed with item no. 7	7
16	75-mm lens assembly (for item no. 7)	1	Stowed with item no. 7	7

[a]Container locations are indicated in figure 3-15

The red line underlines the supplied 5mm lens.

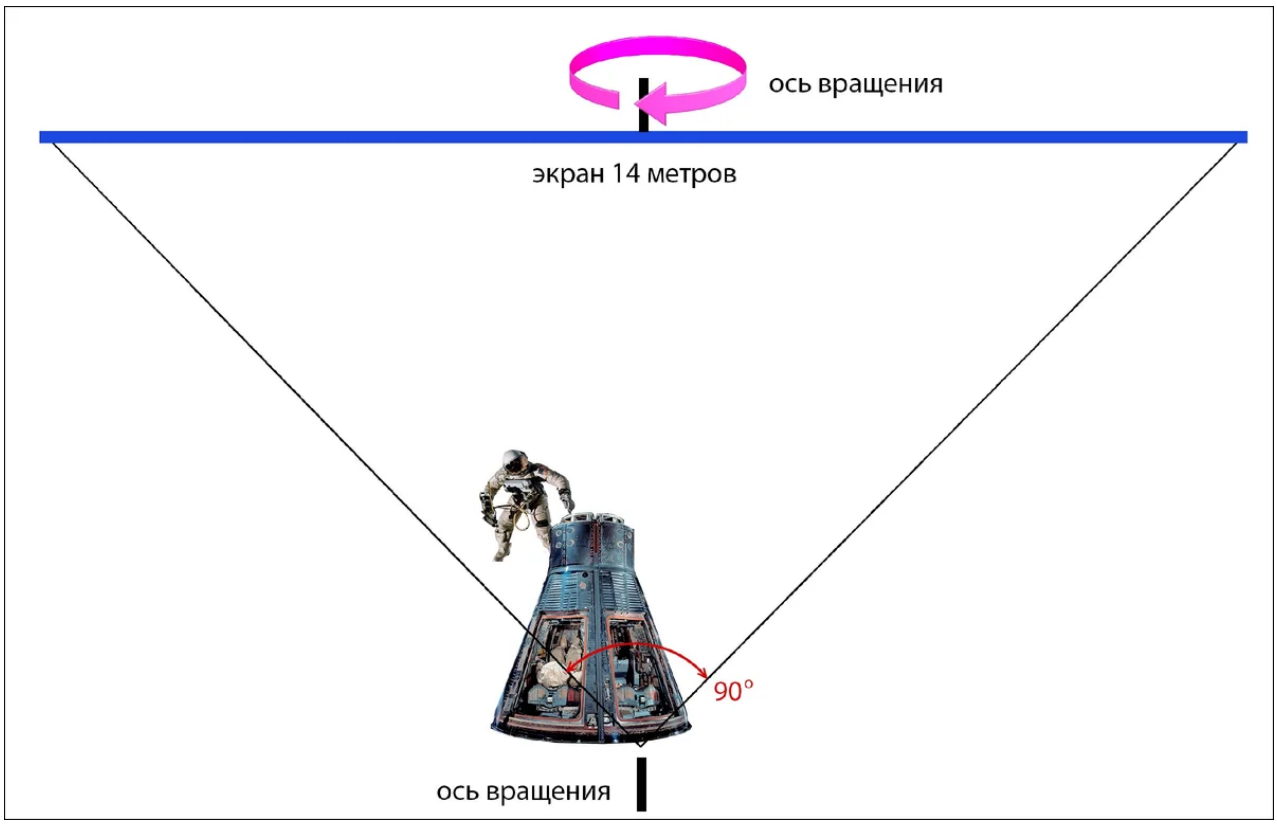
The angle of the lens image field is determined by the formula:

$$\propto = 2arctg\frac{d}{2f}$$

where: d - frame diagonal, f - lens focal length.

The frame diagonal on 16 mm film is 12.5 mm. Substituting the 5 mm lens focal length in the formula, we get an angle of field of the image diagonally 99.6 °, and horizontally - exactly 90 °.

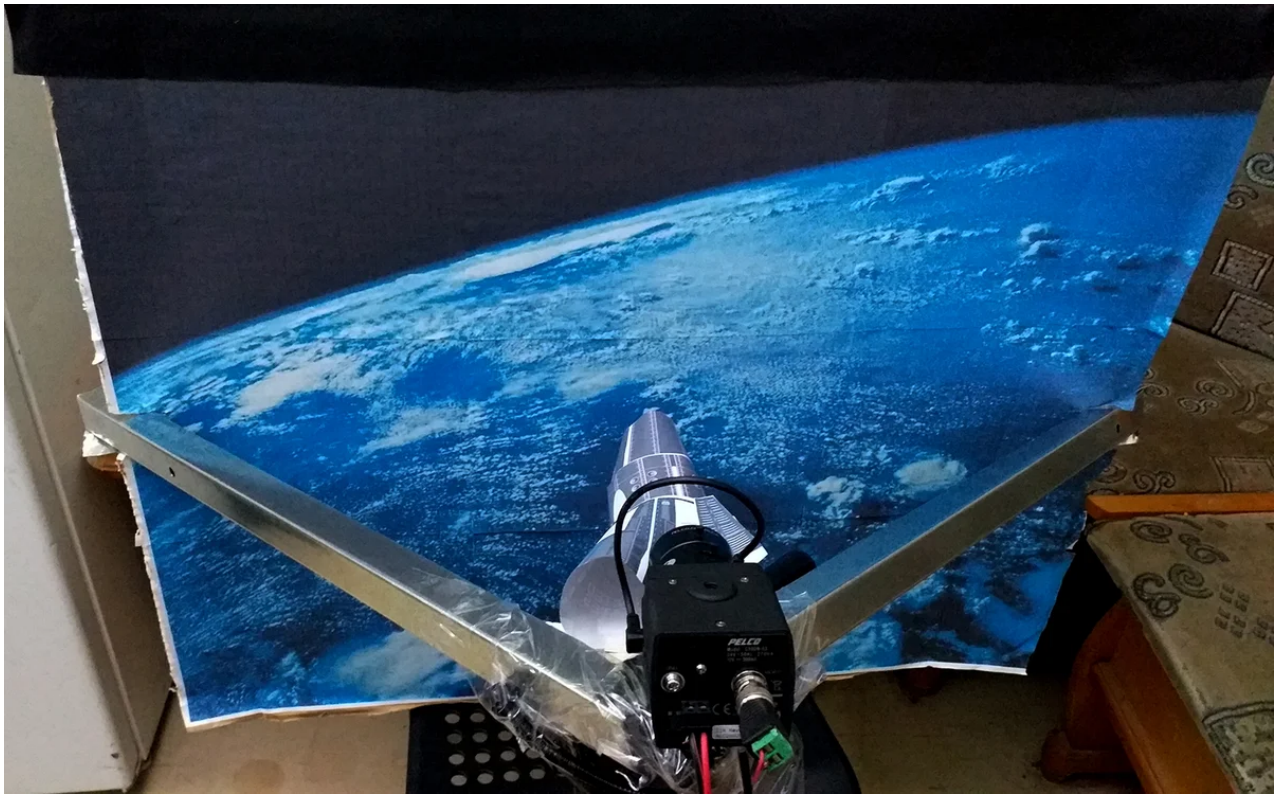
With such an angular field of view at a distance of 7 meters, the lens will cover a screen with a width of 14 meters.



The size of the screen onto which the Earth's cloud layer was projected and the angle of coverage of the 5 mm lens.

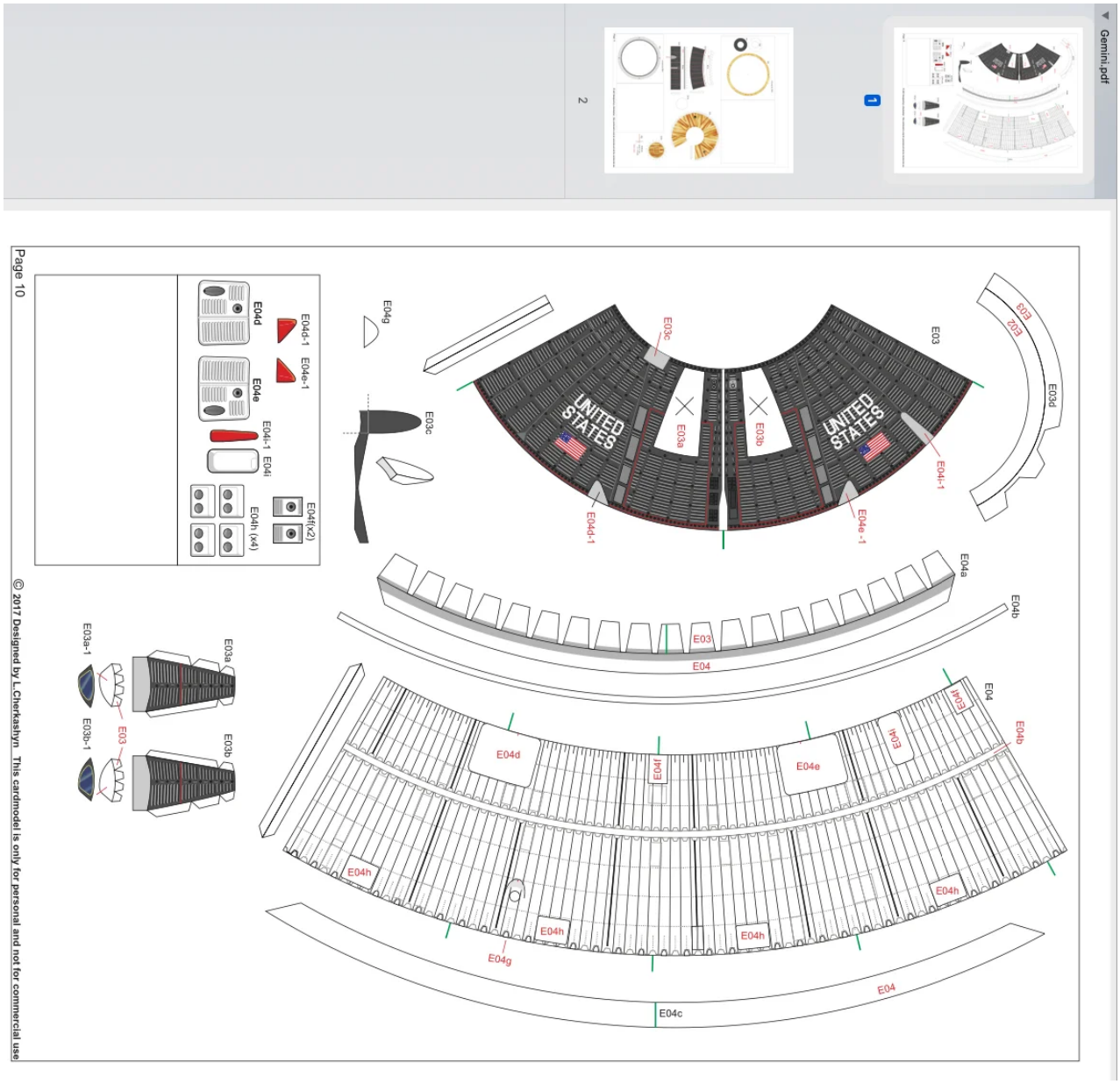
For comparison, we point out that in large cinemas, the screen width can be 22-27 meters.

Since our model of the astronaut was at a scale of 1:20, we took the background on the same scale, which was about 70 cm in width. Against the background, a video camera was fixed at a distance of 35 cm.



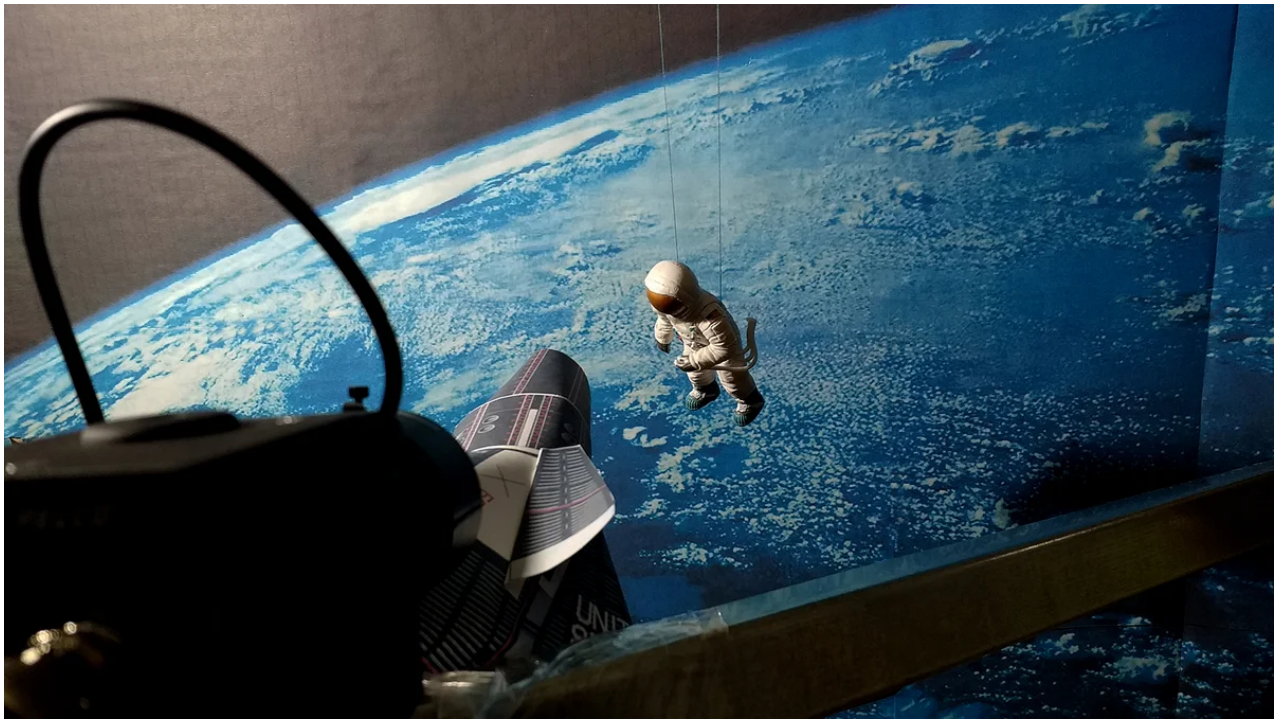
Earth cloud cover background. The metal camera mounts are connected at a 90 degree angle.

A model of the Gemini spacecraft was made from a paper model.



Gemini paper model.

And they installed it in front of the video camera. We made the right hatch door open, as in the NASA video. Near the nose of the "space capsule" an astronaut was suspended on two strings.

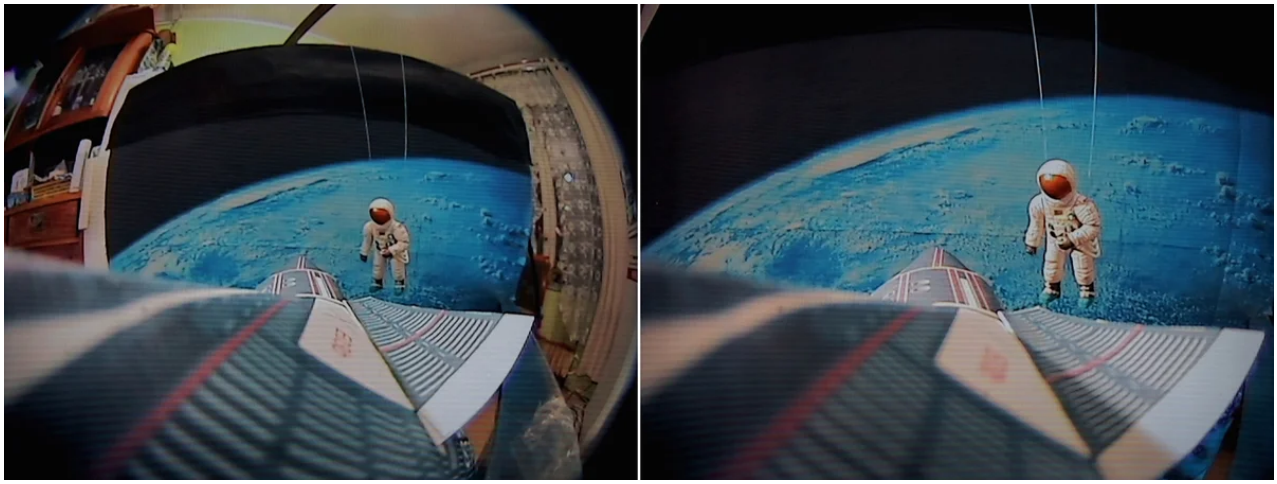


A small figurine of an astronaut against the background of the Earth, hangs near the nose of the Gemini capsule.

The diagonal of the matrix of our video camera was 1/4 inch, which is 2 times less than the diagonal of a frame on 16 mm film. Accordingly, to obtain the equivalent angle of coverage as in the NASA video, the camcorder must have a lens with a focal length of about 2.5 mm. Our camcorder had a variable focal length lens ranging from 1.6 to 3.4 mm.

Filming camcorder with an ultra-wide-angle lens.

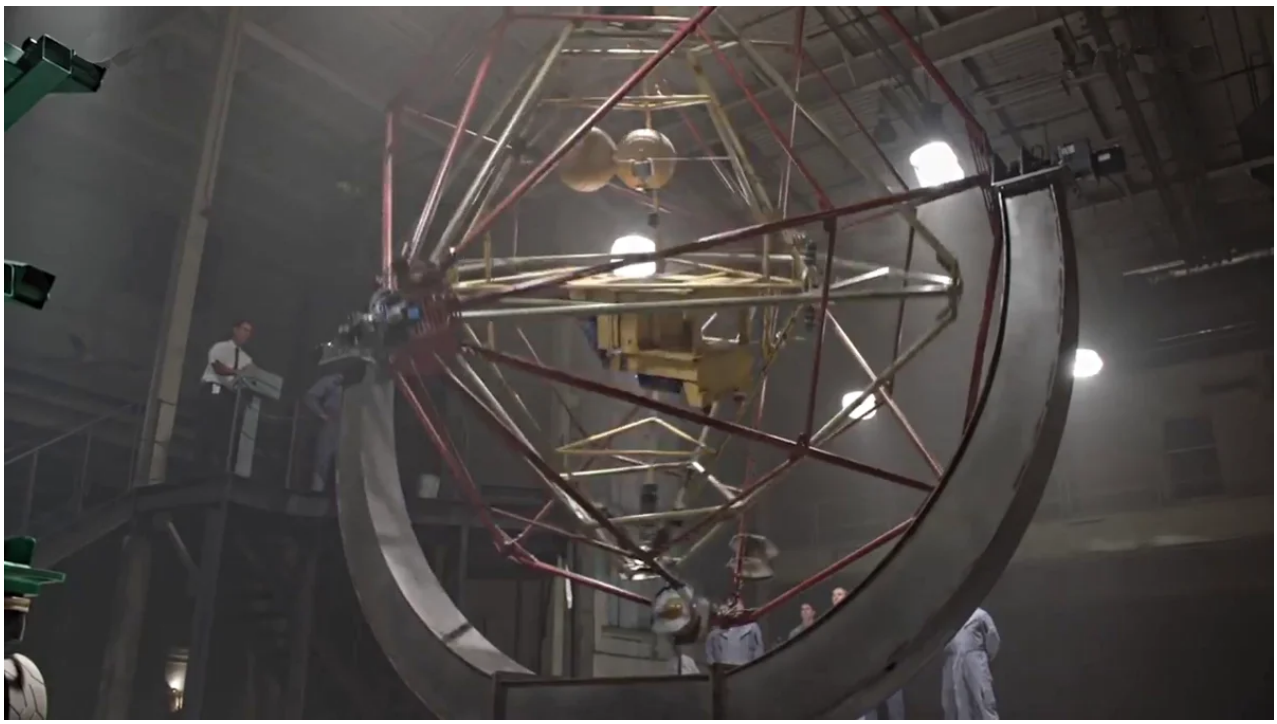
At the maximum "departure" (f = 1.6 mm) there was a strong distortion - curvature of vertical and horizontal lines. When "hitting" it disappeared.



The field of view of the lens at maximum travel (left) and at zoom in.

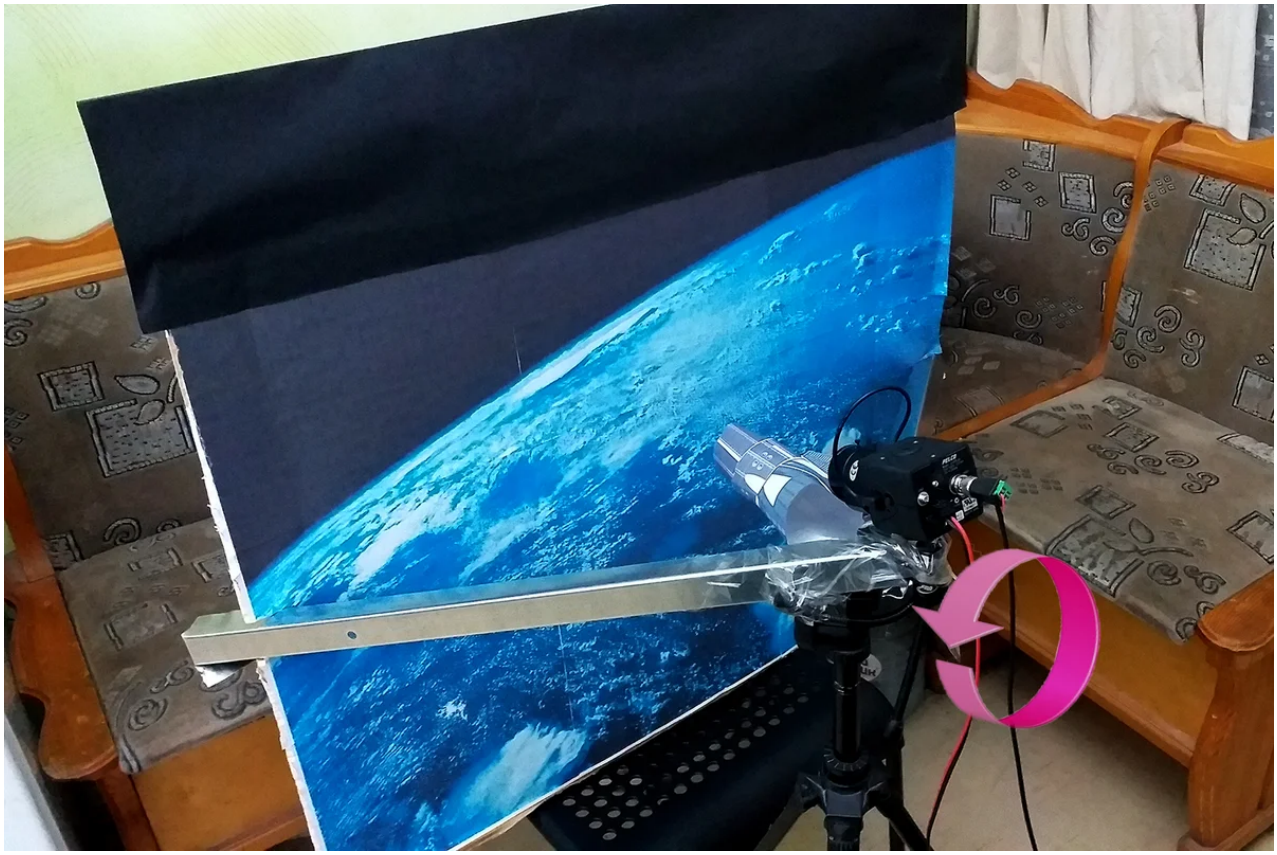
The astronaut in the NASA video rotates in three planes. One rotation - around its vertical axis - is real. Rotation in the other two planes is created by rotating the decoration.

The principle of rotation was taken from a centrifuge for training the vestibular apparatus. The centrifuge is based on a large horseshoe, on the edges of which the axes of the inner rotating structure are located.



Centrifuge for training the vestibular apparatus.

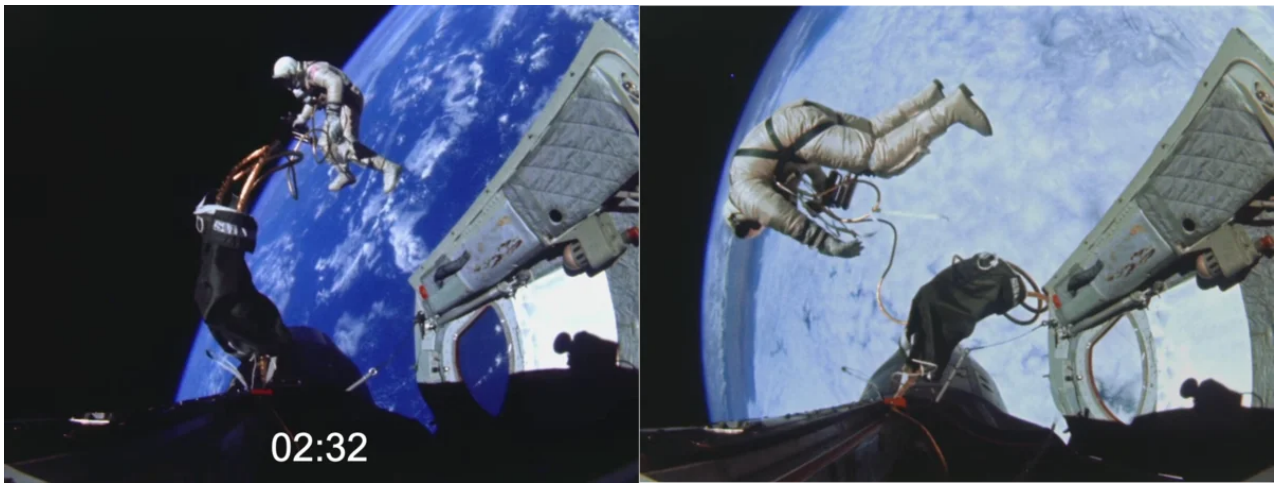
The role of the internal rotating structure in the NASA video is played by a movie screen (on one side) and a filming camera with a capsule mock-up (on the other side). The decoration rotates like a wheel around the attachment axis. One axis of the mount is next to the camera, the other axis is behind the screen.



The decoration rotates around an axis.

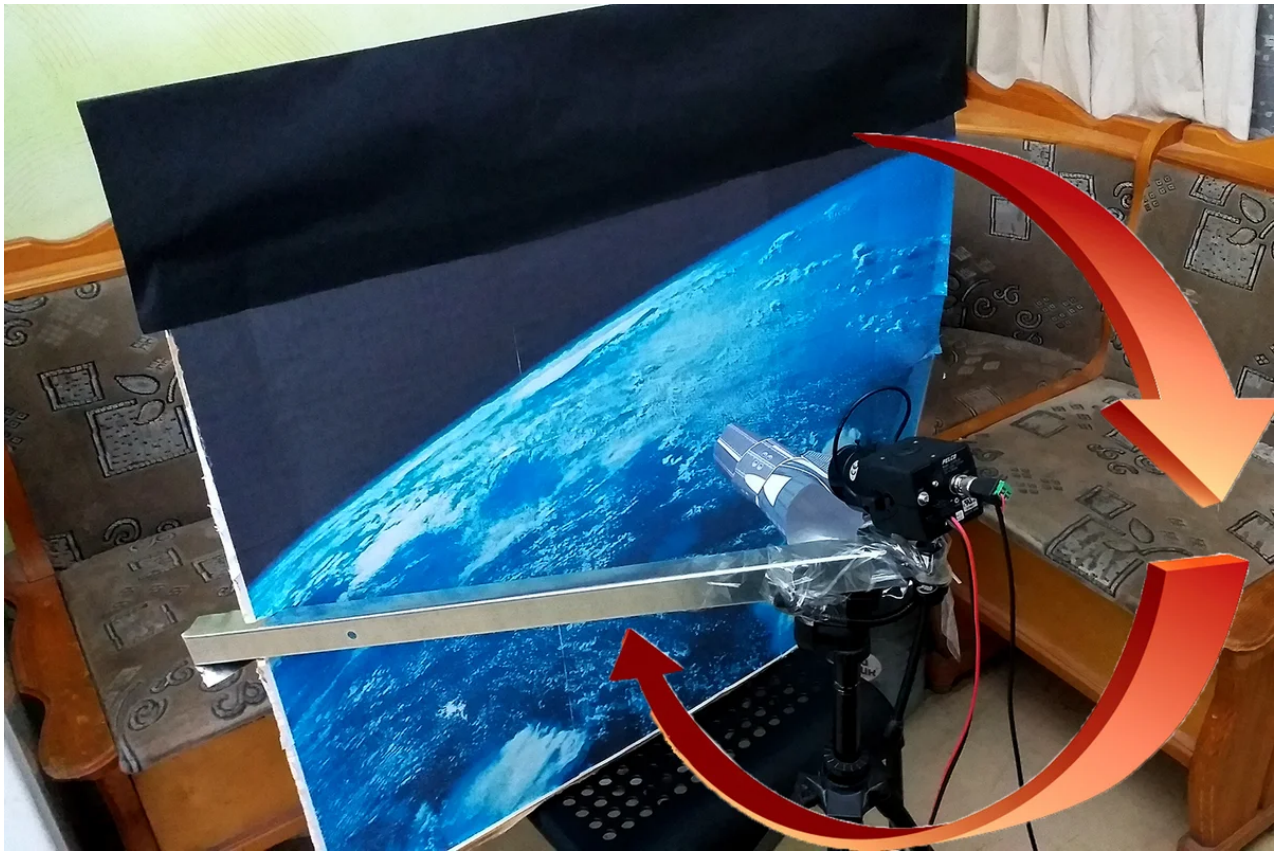
In our case, the decoration could rotate about 180 ° left and right, since the side mounting rails rested against the astronaut's suspension and limited the rotation angle. The axle was made from a conventional long bolt going through a hole in the metal profile. In order for the decoration to turn almost a full turn (and this is exactly how it is done in the NASA video), there should be only one mounting rail. This rail does not carry any load, it is only needed to synchronize the rotation of the camera with the screen, and the weight of the screen is small here. Since the actor's suspension occupies a sector of a circle of approximately 20-30 °, then with one mounting beam, the camera can be rotated by 330-340 ° around the axis.

When such a decoration is turned to the right, clockwise, relative to the hanging actor, it seems that the astronaut is turning to the left, counterclockwise, upside down.



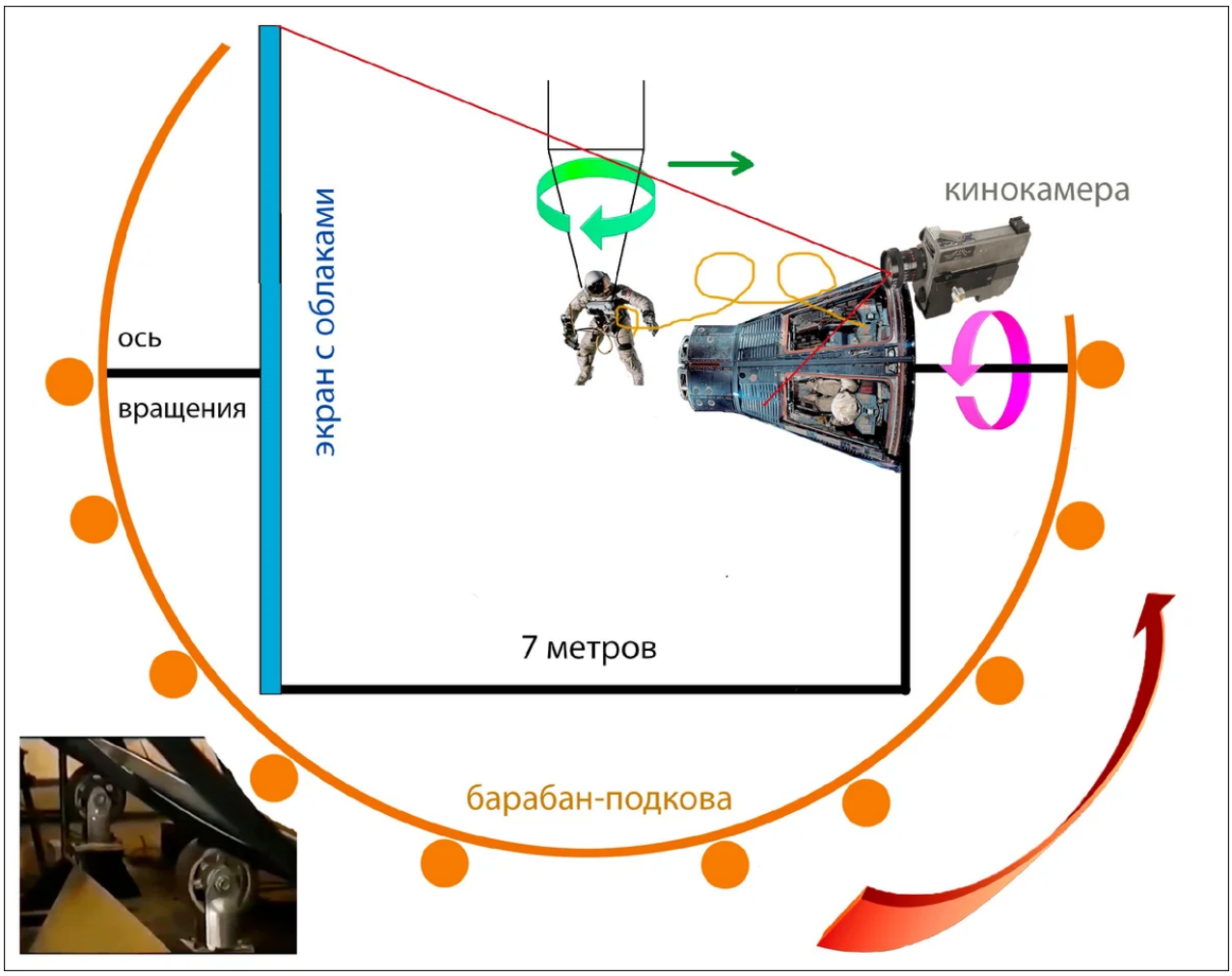
It feels like the astronaut is turning upside down.

In addition, the decoration should rotate in a different plane, due to the "horseshoe", which at the beginning of the article we called the drum.



The decoration must also rotate in a perpendicular plane.

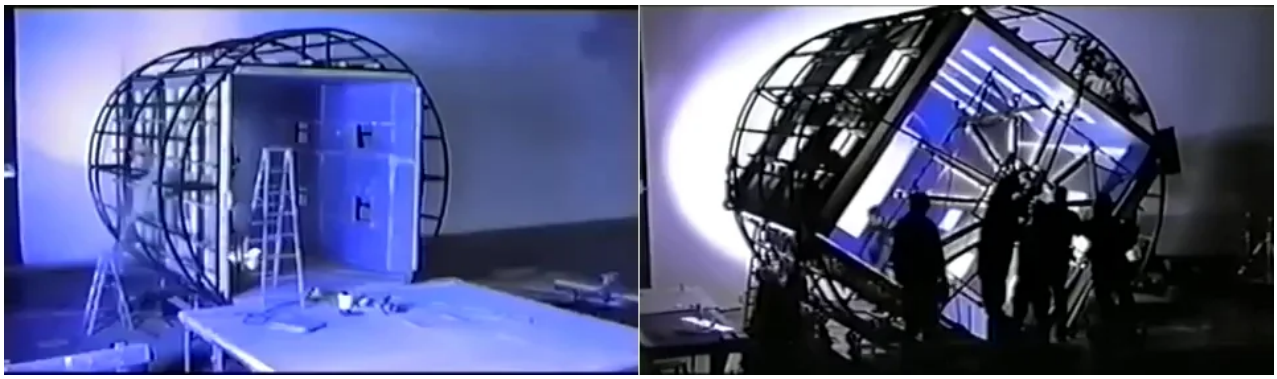
Outwardly, it is, of course, a half-cut drum. But in profile it is somewhat like a horseshoe. It rotates on rollers.



General view of the structure for imitating weightlessness.

Such rotating sets are not uncommon, we have already given an example from the movie "2001. A Space Odyssey", where a scene with a stewardess walking along the wall and ceiling was filmed in a rotating room. There was an article about this "Rotary decoration for weightlessness, or "Gemini-4" solution ".

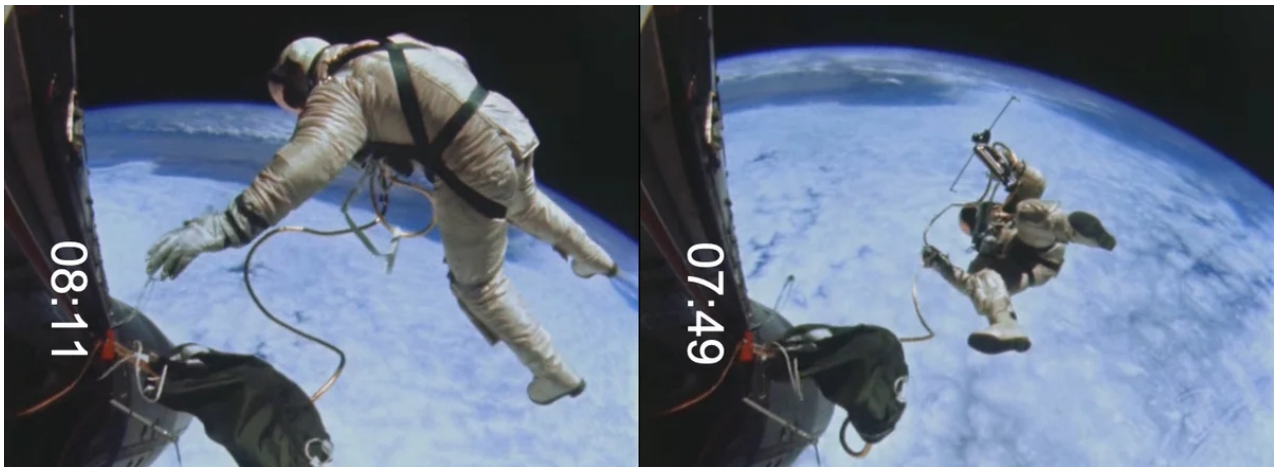
And the videos that support the big drum, and on which it rotates, you can see in a small video - about how the video "Buy, buy, buy" by the NSync group was filmed.



Rotating room decoration.

The camera was attached to the set and rotated along with the walls. VIDEO about the shooting of the video for the NSync group:

As can be seen from the above diagram of "photographing weightlessness in the pavilion", this drum, in order not to catch the cables, can rotate no more than 120 °. To obtain the lowest possible angle (at this moment we see the astronaut's heels), it is advisable to move the actor to the right, from the capsule nose closer to the hatch (in the direction of the green arrow), then the upper part of the movie screen will not catch the cable.

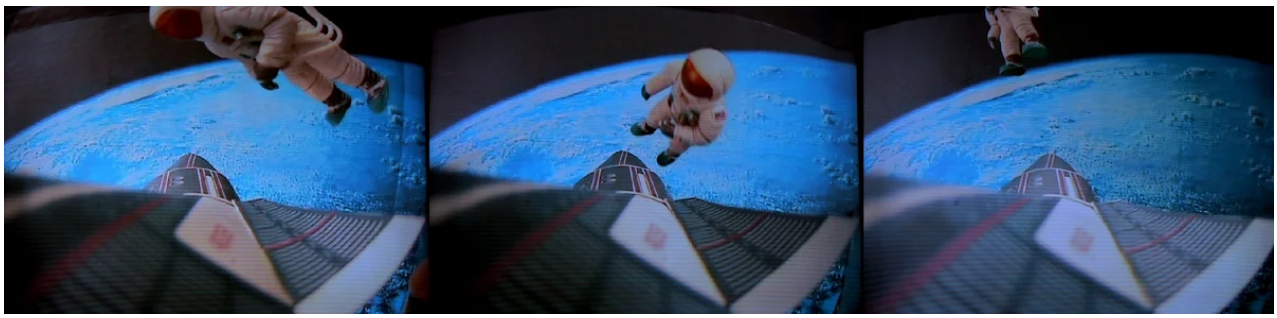


The top and bottom views are obtained by rotating the horseshoe drum. The angle of rotation is not more than 120 °.

We did not complete the process on our models, although a large plastic barrel was purchased for making the drum.

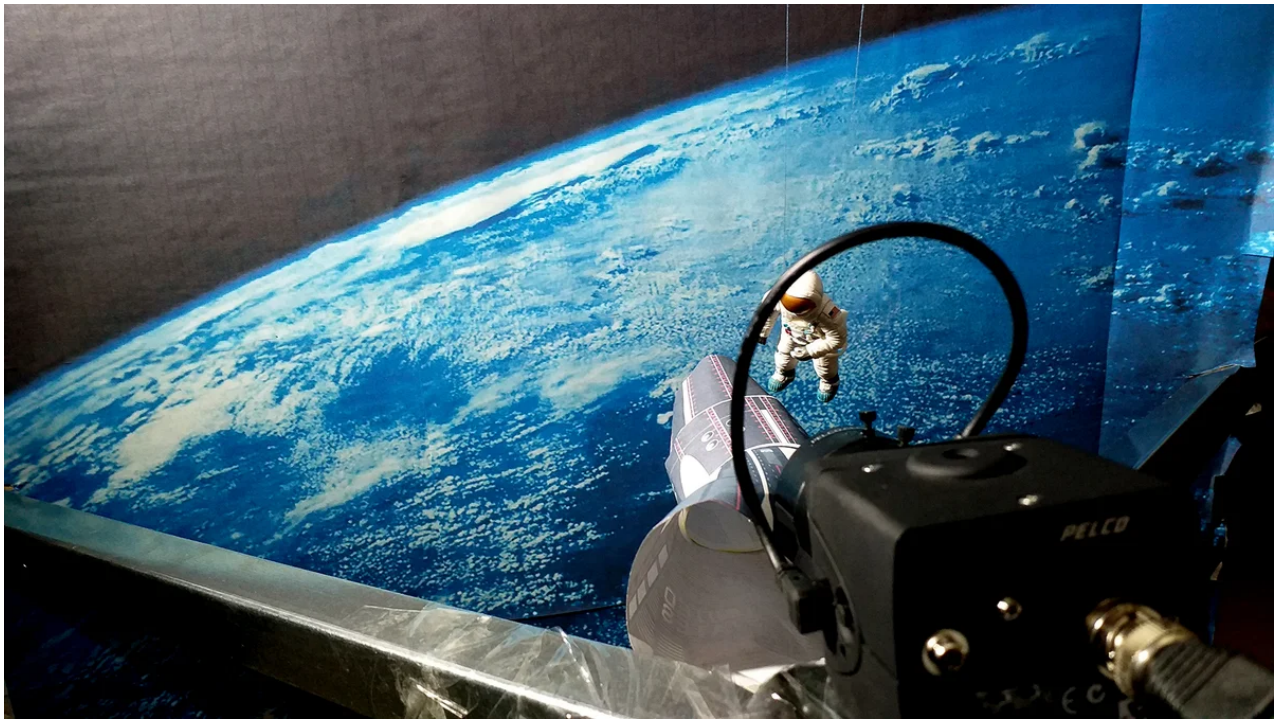
We did not like the fact that at a scale of 1:20 the Gemini capsule hatch is very close to the front lens of the objective, literally three centimeters away. If you do it in sharpness, then the background appears without sharpness. If you focus on the background, then without sharpness you get a foreground with a hatch. In fact, shooting is carried out in macro mode. And despite the small focal length of the lens, it lacks depth of field. Therefore, we decided in the near future to make an astronaut on a 3D printer at a scale of 1:15 or even 1:10, respectively, double the scale of the screen and repeat the entire experiment from start to finish.

However, we filmed a short video, rotating the set in different directions around the motionless model of the astronaut. Easily got a top view (when the top of the helmet is visible), a bottom view (when the astronaut's heels are facing the camera), and different side views.



Stills from the video: side view, top view, bottom view.

As soon as we have free time, we will continue to tell you how we filmed weightlessness in the Gemini 4 space program. After all, we have not yet covered a very important question - where was the film projector and how was it mounted?



Probably, you can guess that not only in "Gemini-4" was falsification. Exactly the same falsification, only less successful, was shown in other "spacewalks", be it Gemini 9 or Gemini 11.

For example, look, "spacewalk "from the Gemini-11 spacecraft . Here the" astronaut "hangs on a cable for 2 minutes and 20 seconds in the same place. Probably earlier, when everyone had tiny TVs and few saw real spacewalks, this could have produced some impression of believability, but now it is clear that all of this is naive combined filming with the banal hanging of an actor on a rope, which was used in the creation of Hollywood films of that time on a space theme.

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Cameraman L. Konovalov was with you. Until next time!

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